

# WP4.G. Witch flounder (*Glyptocephalus cynoglossus*)

Draft Presentation  
For Peer Review Only.  
Does not represent  
final NOAA Decision/Policy.  
4/28/08

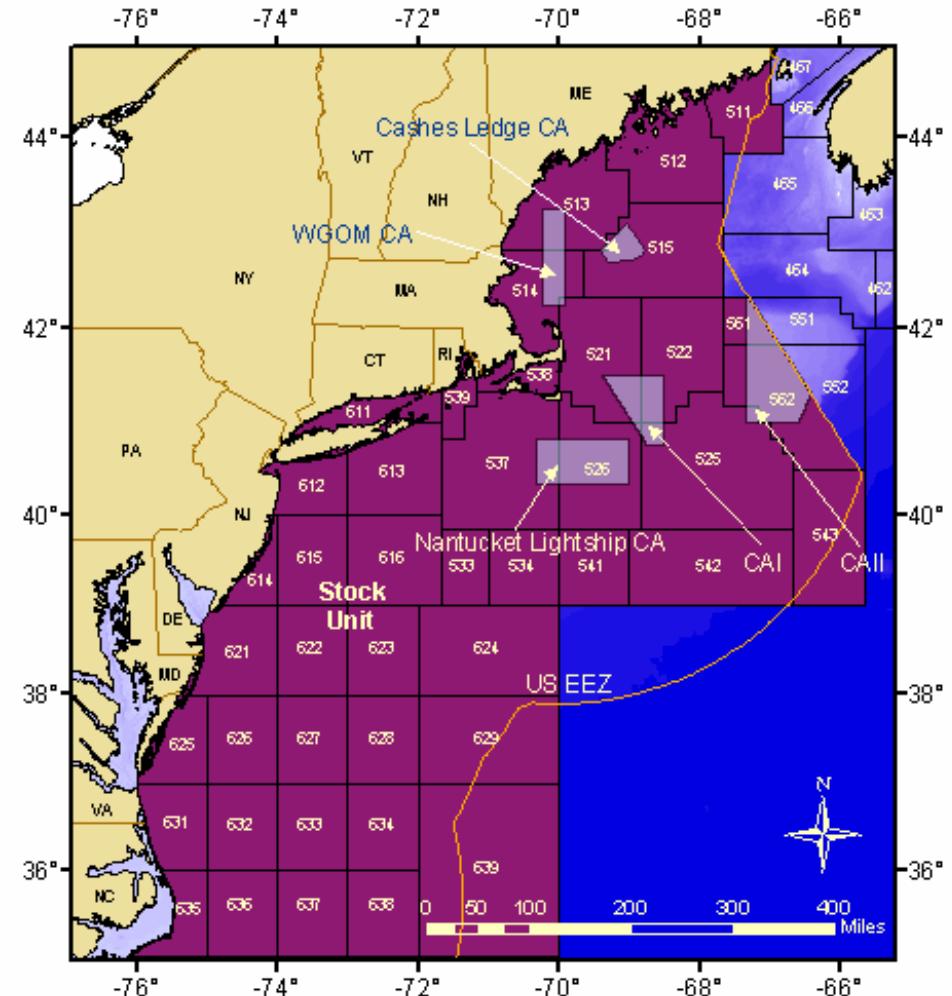
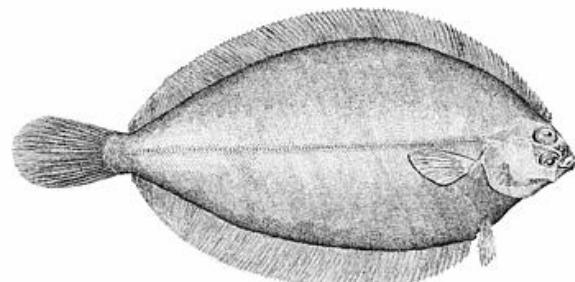


Figure 10.1. Statistical areas used to define the巫flounder stock.

Images taken from SOS website

## G. WITCH FLOUNDER: brief overview

Landings 1960 to present; provisional landings 1937 to 1959  
LAA 1982 -2006

Discards DAA for large-mesh otter trawl fleet 1982 -2006  
DAA for northern shrimp trawl fleet 1982-2006  
Discard weight from small-mesh otter trawl fleet 1989 – 2006

No recreational catch

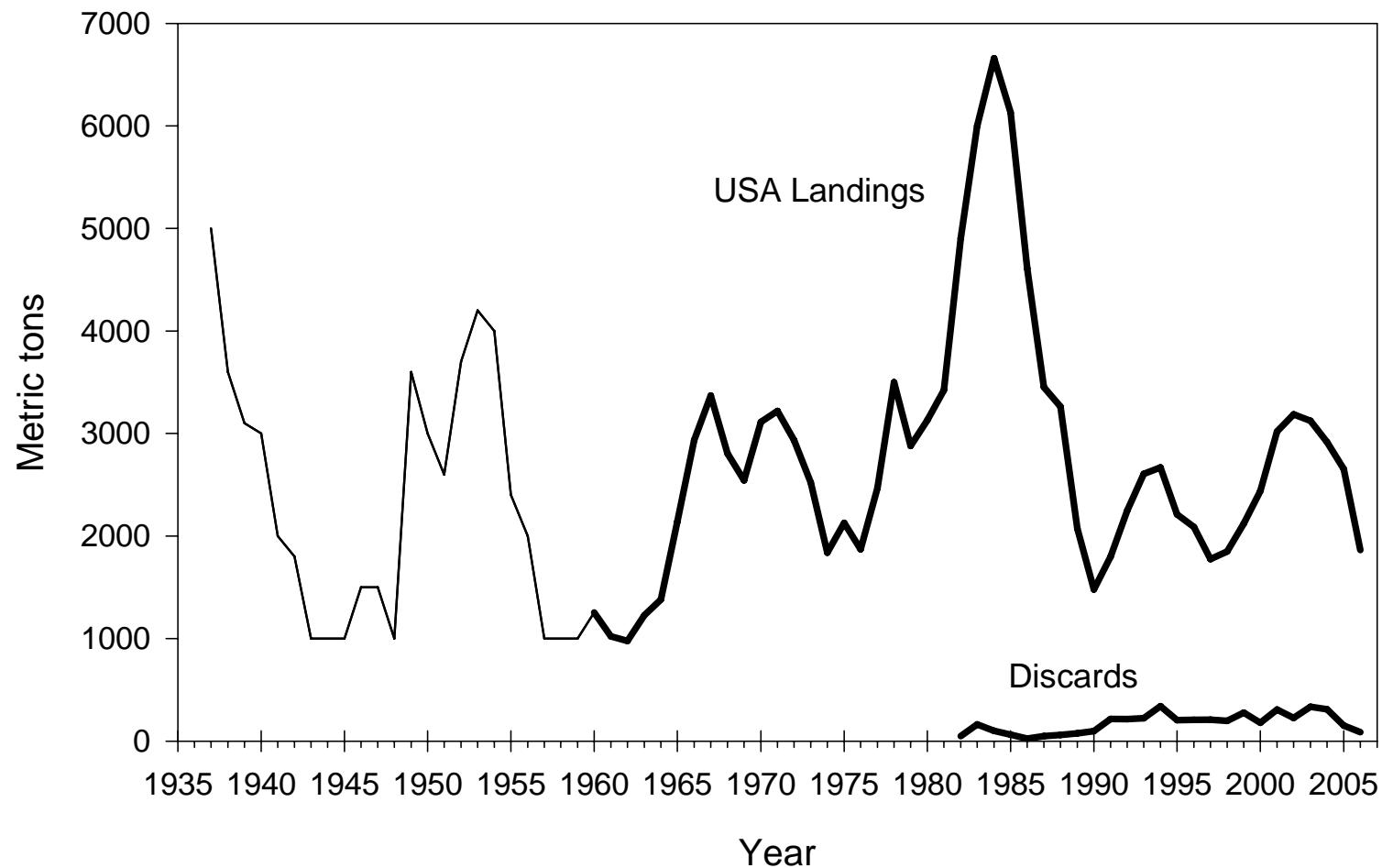
Total CAA = (LAA + DAA<sub>lmot</sub> + DAA<sub>shr</sub>) bump up by s-m trawl discard

NEFSC spring and autumn survey indices used for tuning  
indices updated through spring 2007; no significant conversion factors  
Maturity - annual ogives are based on NEFSC spring 5-yr pooled data for females  
data through spring 2007

M assumed constant 0.15

Retrospective patterns have been present in previous VPAs:  
F underestimated, SSB overestimated, and Age 3 recruits consistently estimated  
with notable exceptions.

## G. WITCH FLOUNDER



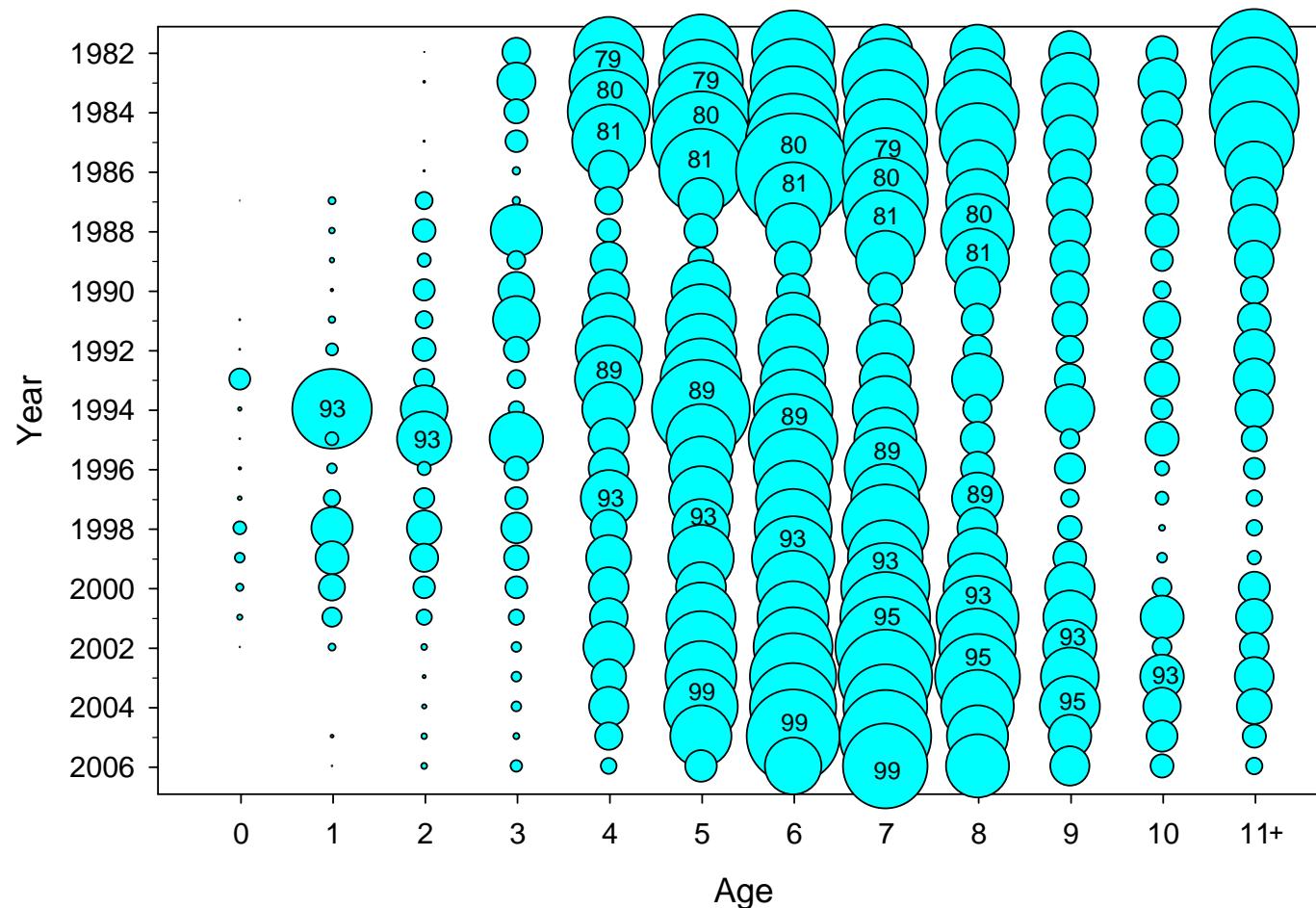
1937-1959 provisional landings taken from Lange and Lux (1978)

Discards from 3 fleets: large-mesh otter trawl fishery, shrimp trawl fishery, and small-mesh otter trawl fishery

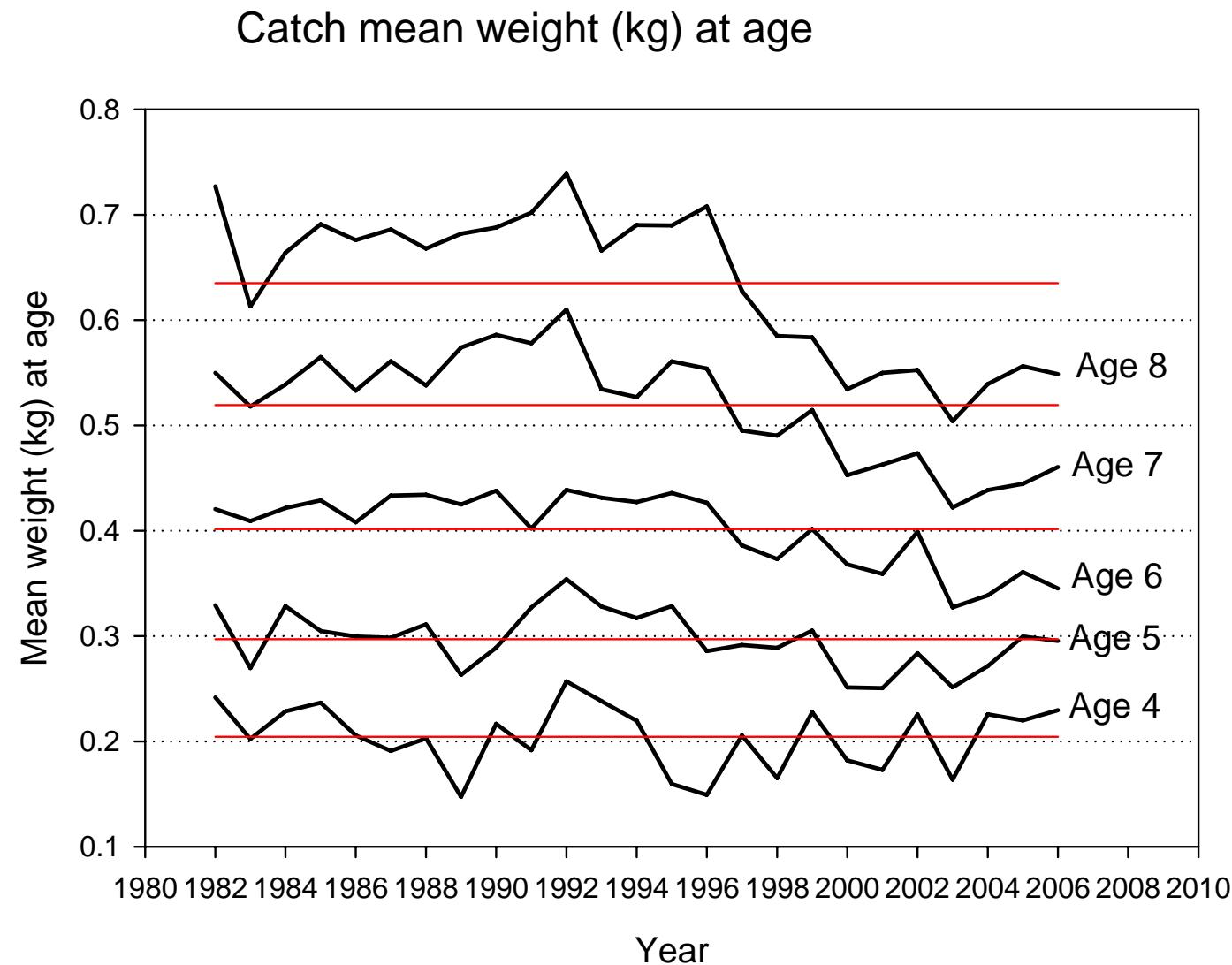
# G. WITCH FLOUNDER

Total Catch at age

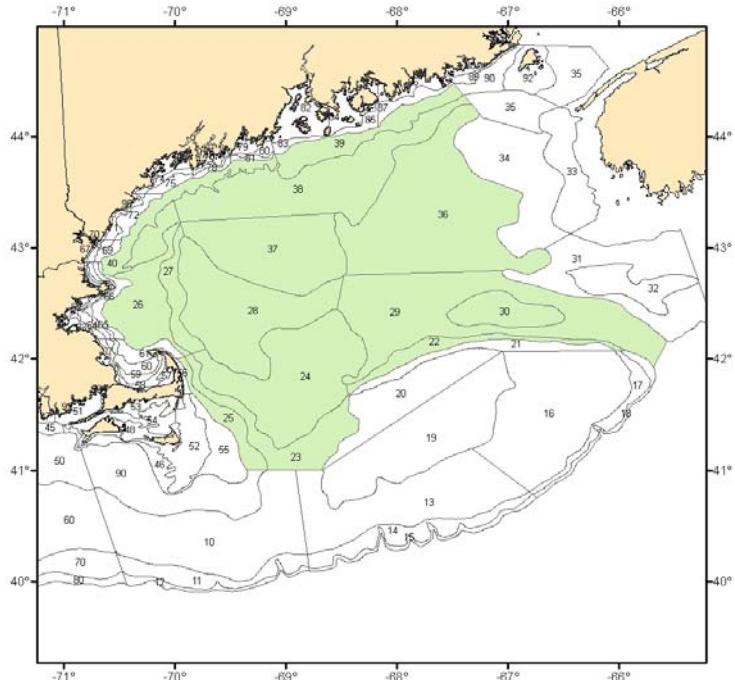
Witch Flounder



## G. WITCH FLOUNDER

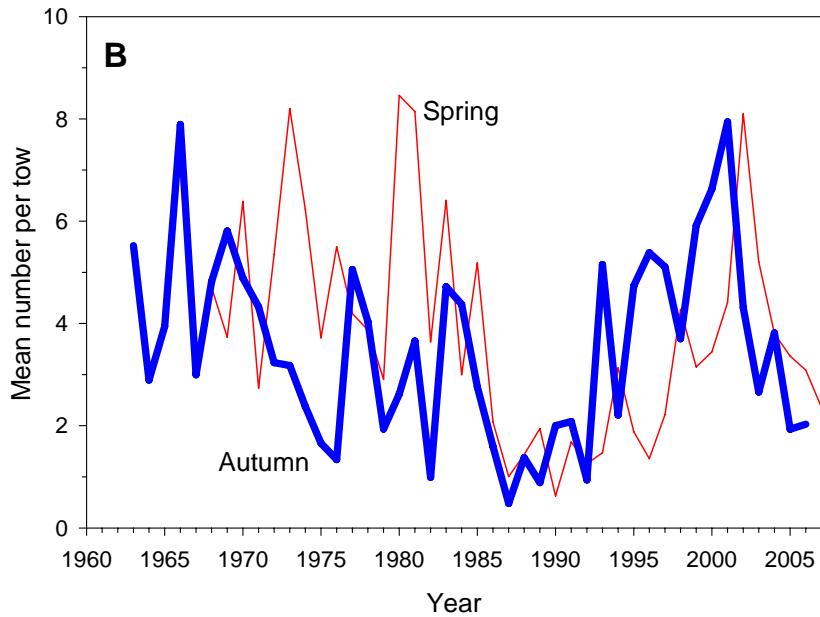
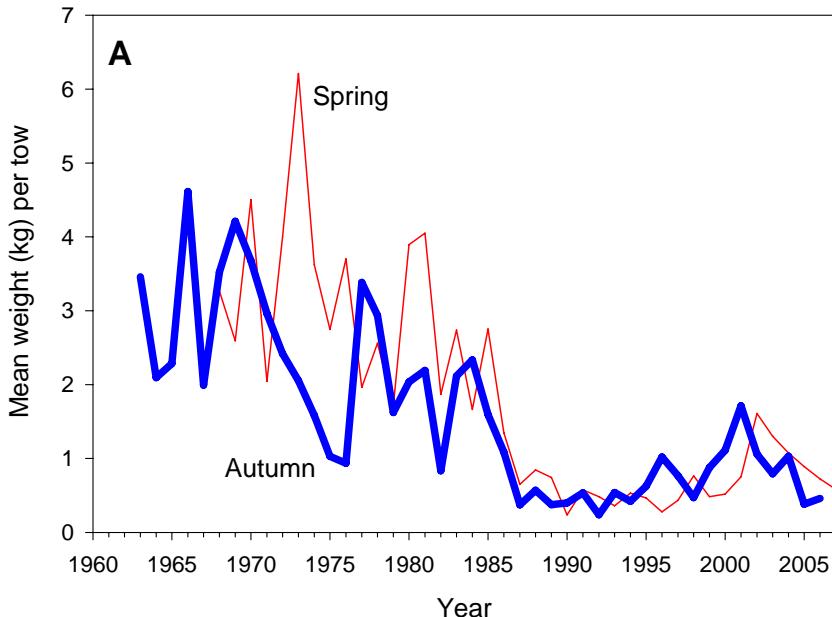


## G. WITCH FLOUNDER



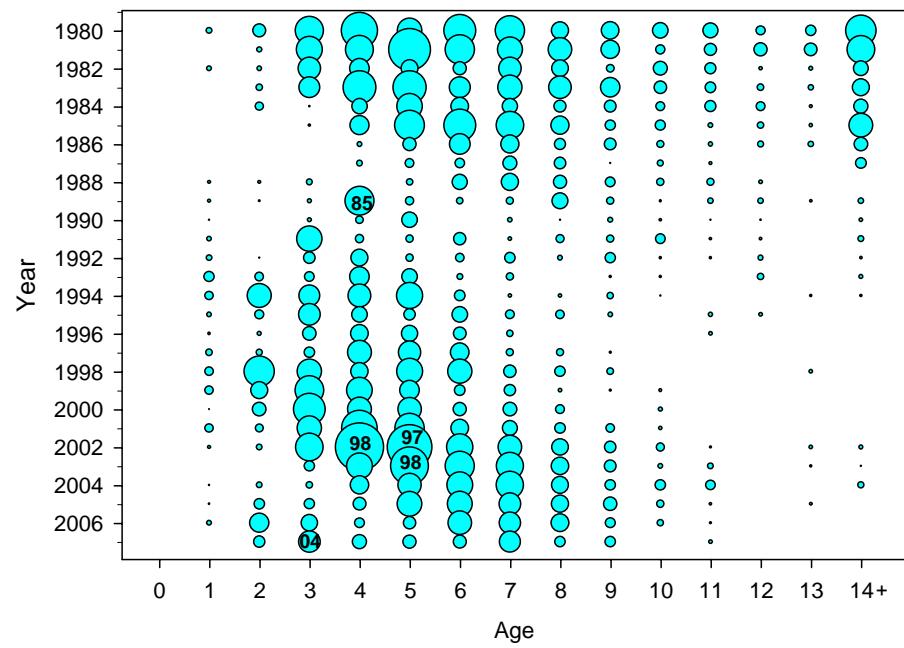
NEFSC bottom trawl survey  
offshore strata 22-30, 36-40

No significant survey conversion factors

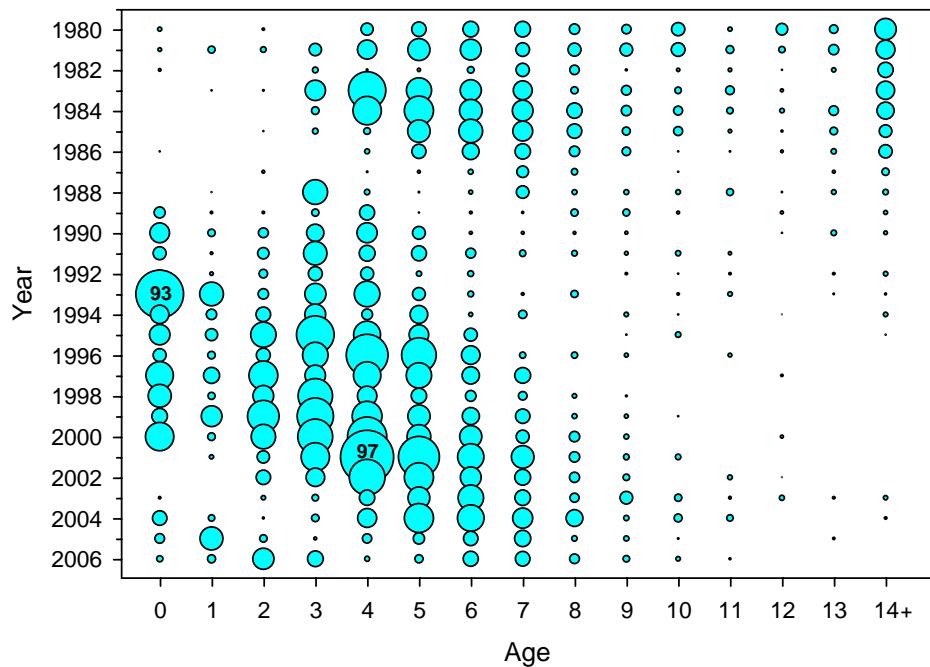


## G. WITCH FLOUNDER

Spring Survey: Stratified mean number per tow at age

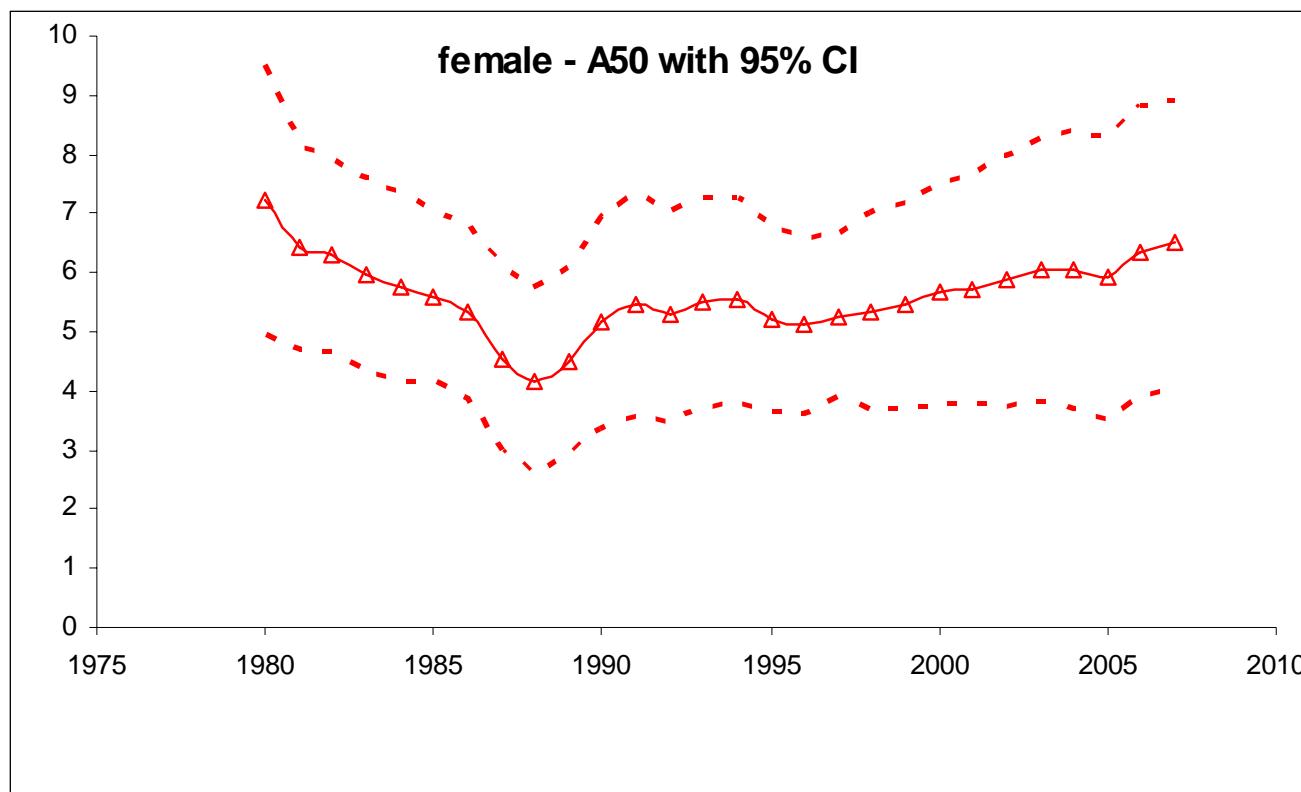


Autumn Survey: Stratified mean number per tow at age



## G. WITCH FLOUNDER

Witch flounder median maturity at age



## G. WITCH FLOUNDER

### Overview of GARM 2008 meetings

#### GARM 2008 Data Meeting

- unit stock not impacted by area allocation
- minor changes in landings; LAAs are updated
- large-mesh otter trawl discards are re-estimated
  - using a combined ratio estimator ( $d/k_{all}$ )
- small-mesh otter trawl discards are estimated

#### GARM 2008 Assessment Model Meeting

- Sufficient data to support an age-structured model assuming negligible error in the catch-at-age.
- Suggested exploration of the retrospective pattern using either ADAPT or ASAP

#### GARM 2008 Biological Reference Point Meeting

- Two formulations of VPA to estimate F and SSB in 2006

- BASE RUN

- SPLIT RUN where survey tuning indices are split between 1994 and 1995

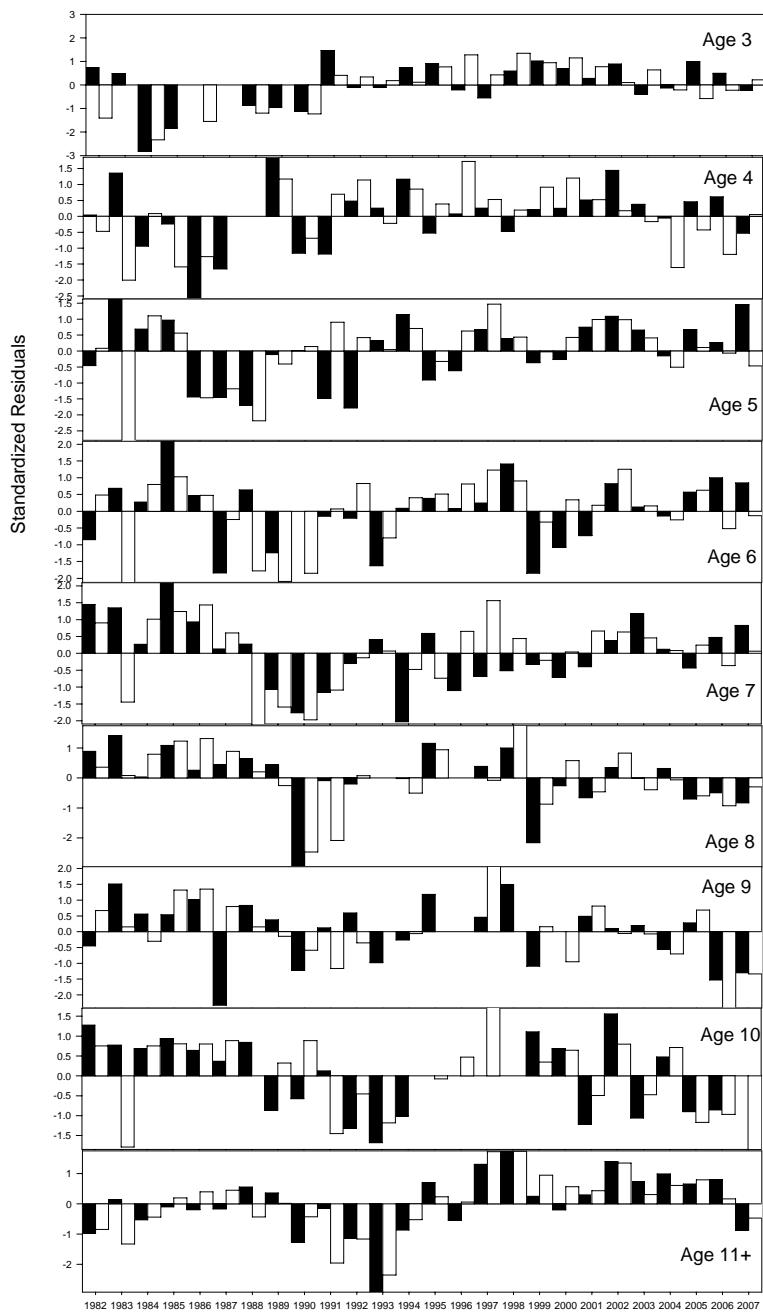
## G. WITCH FLOUNDER

	GARM 2005 BASE RUN	GARM 2008 BASE RUN	GARM 2008 SPLIT RUN
Software	NFT 231	NFT VPA 2.7.7	NFT VPA 2.7.7
CAA	1982-2004 3-11+	1982-2006 3-11+	1982-2006 3-11+
Est.Ages	3-10	3-10	3-10
NMFS-s	3-11+	3-11+	3-11+
NMFS-a	3-11+	3-11+	3-11+
M.S.R.	0.811	0.838	0.699
N3 (cv)	3,902 (.65)	42,333 (.66)	17,353 (.62)
N4 (cv)	4,053 (.46)	9,745 (.47)	4,858 (.44)
N5 (cv)	9,206 (.39)	1,963 (.39)	1,001 (.38)
N6 (cv)	14,614 (.35)	2,725 (.36)	1,382 (.36)
N7 (cv)	19,943 (.32)	5,741 (.34)	3,006 (.36)
N8 (cv)	17,315 (.30)	5,001 (.38)	2,427 (.44)
N9 (cv)	8,815 (.27)	7,810 (.29)	3,480 (.33)
N10 (cv)	2,245 (.37)	7,270 (.24)	2,294 (.35)
Age 3 in T+1 (>000s)	3,902	42,334	17,354
F 1	-	-	-
F 2	-	-	-
F 3	0.006	0.004	0.008
F 4	0.032	0.033	0.064
F 5	0.066	0.078	0.149
F 6	0.069	0.109	0.198
F 7	0.077	0.253	0.466
F 8	0.114	0.100	0.211
F 9	0.284	0.045	0.136
F10	0.199	0.072	0.173
F11+	0.199	0.072	0.173
Ave F 8-9	0.199	0.072	0.173
SSB ('000 mt)	21,175	13,240	5,921

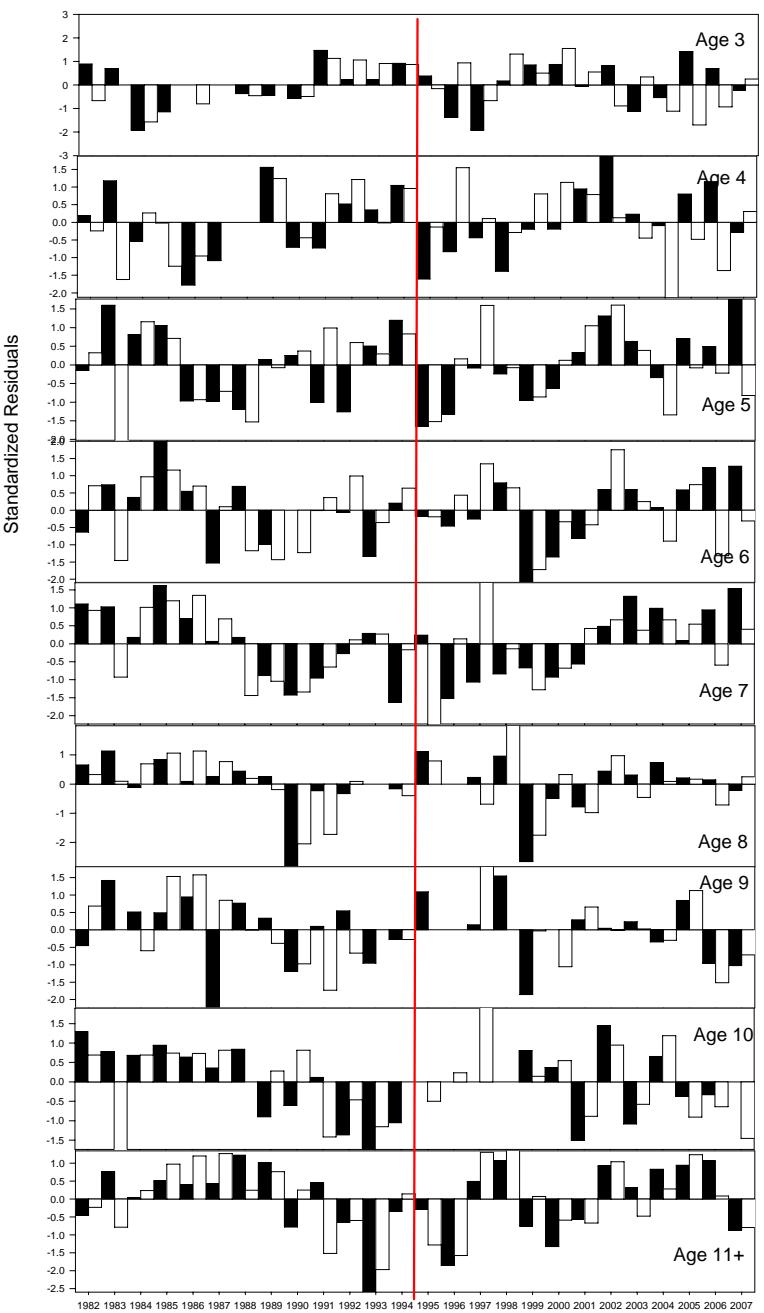
← Age 3 recruits

← F  
← SSB

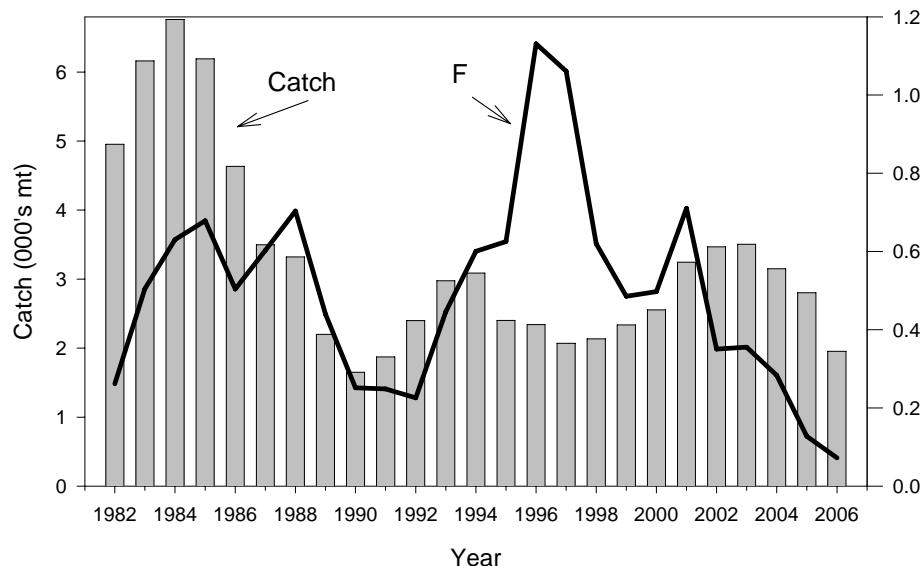
# BASE RUN



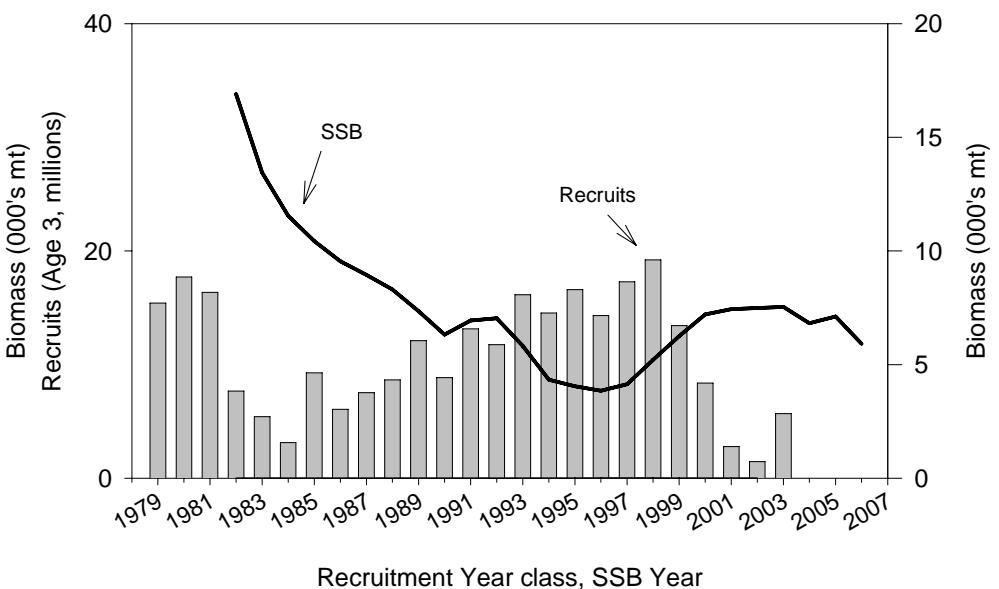
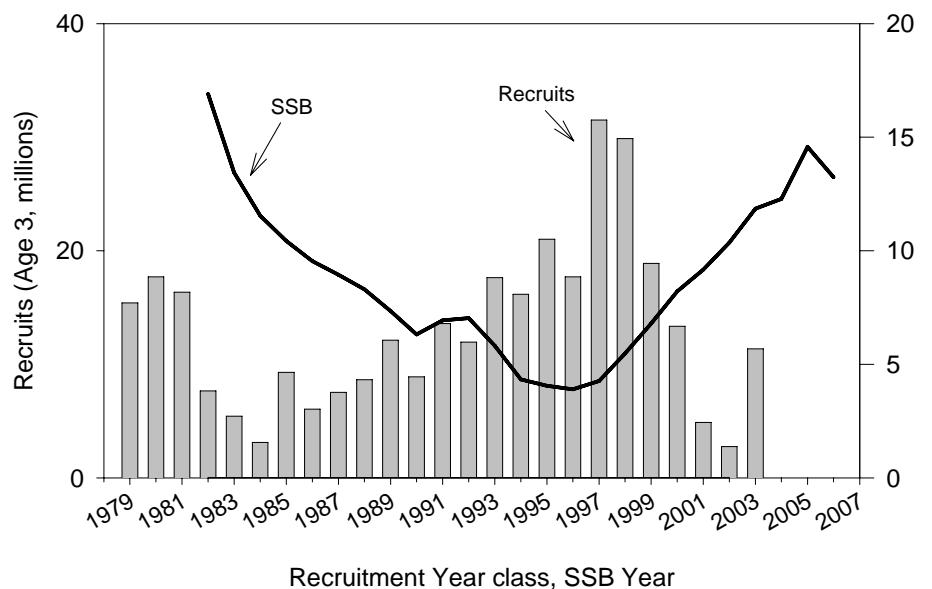
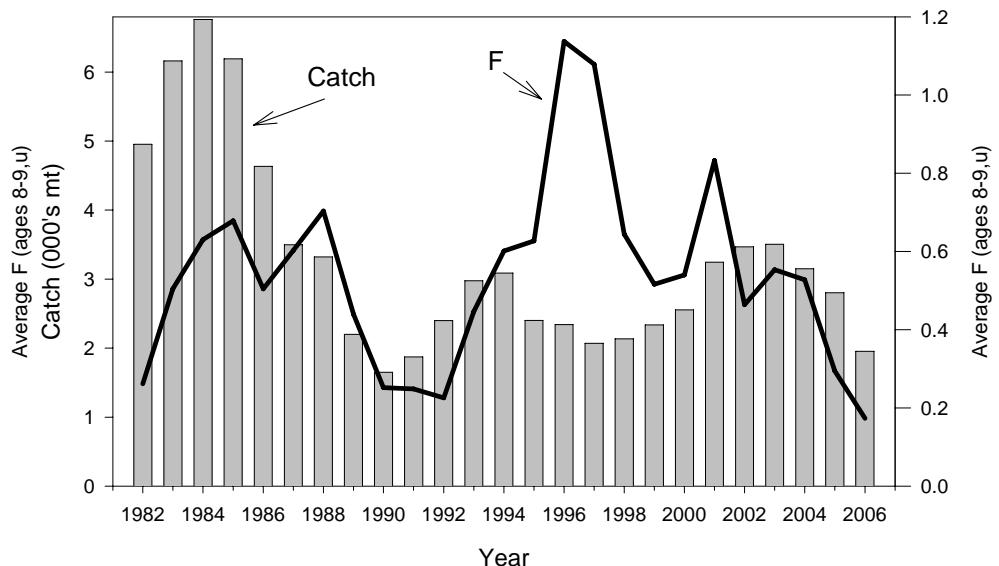
# SPLIT RUN



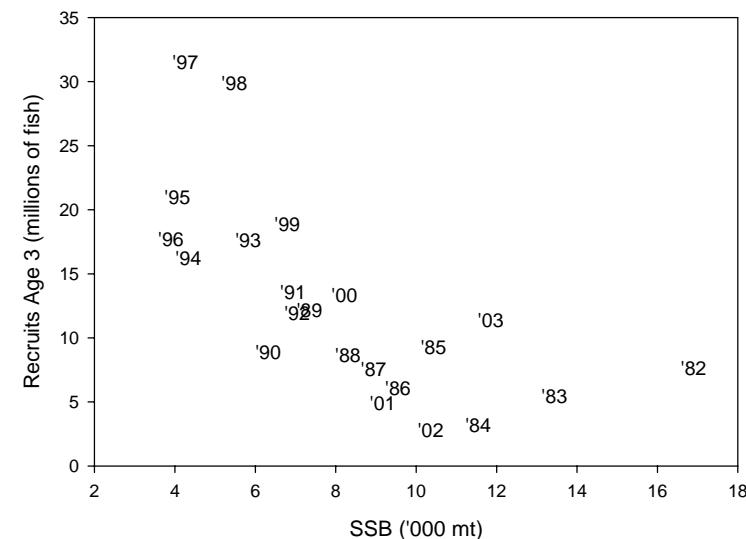
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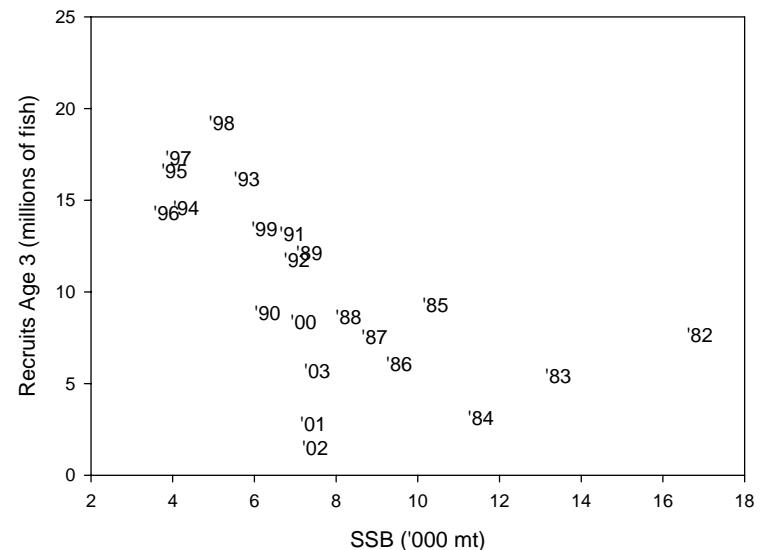
# SPLIT RUN



# BASE RUN

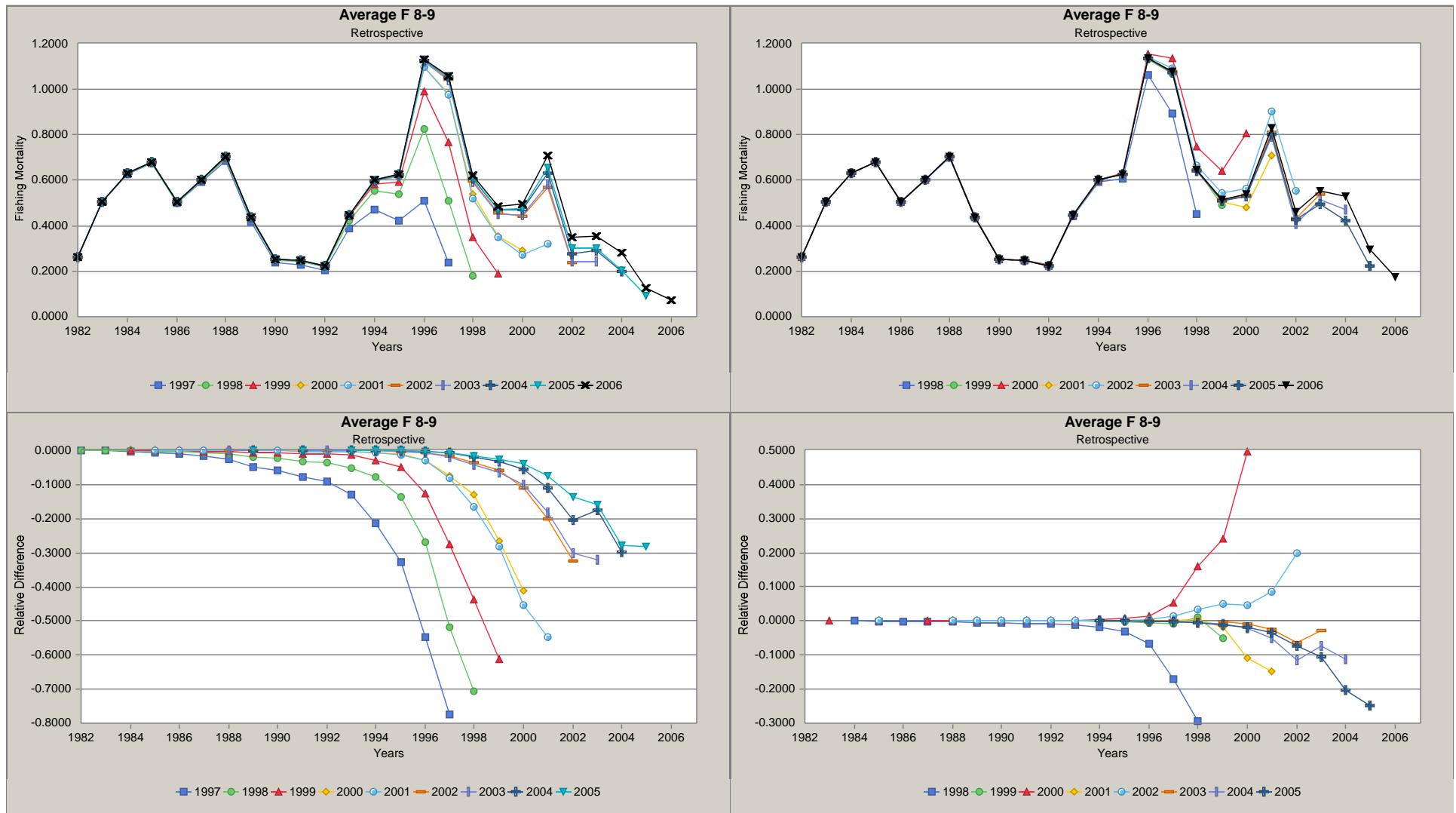


# SPLIT RUN



# BASE RUN

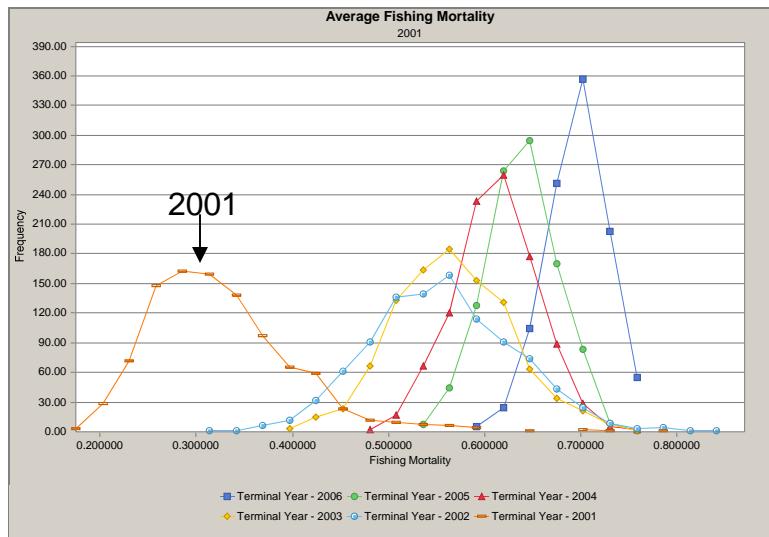
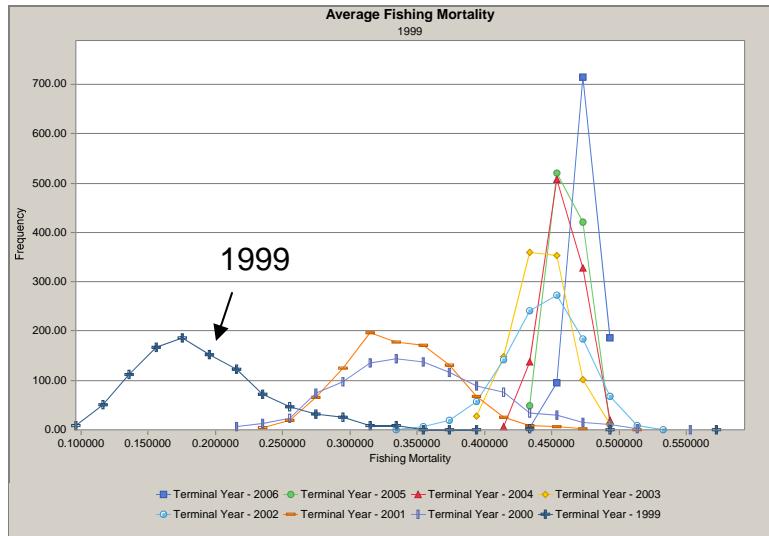
# SPLIT RUN



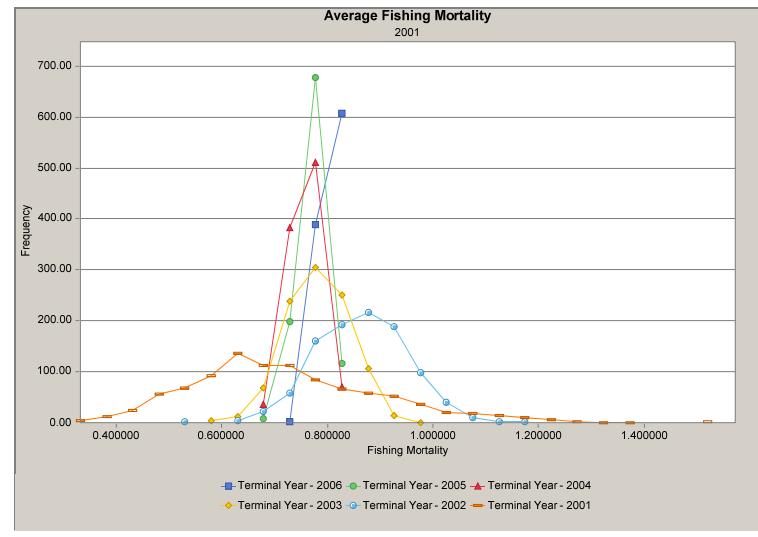
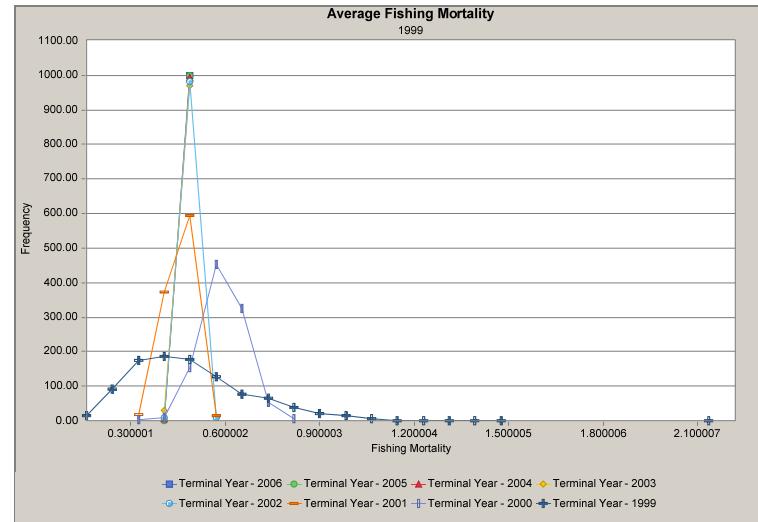
## FISHING MORTALITY

*Next slide...distribution slices for 1999 and 2001*

# BASE RUN



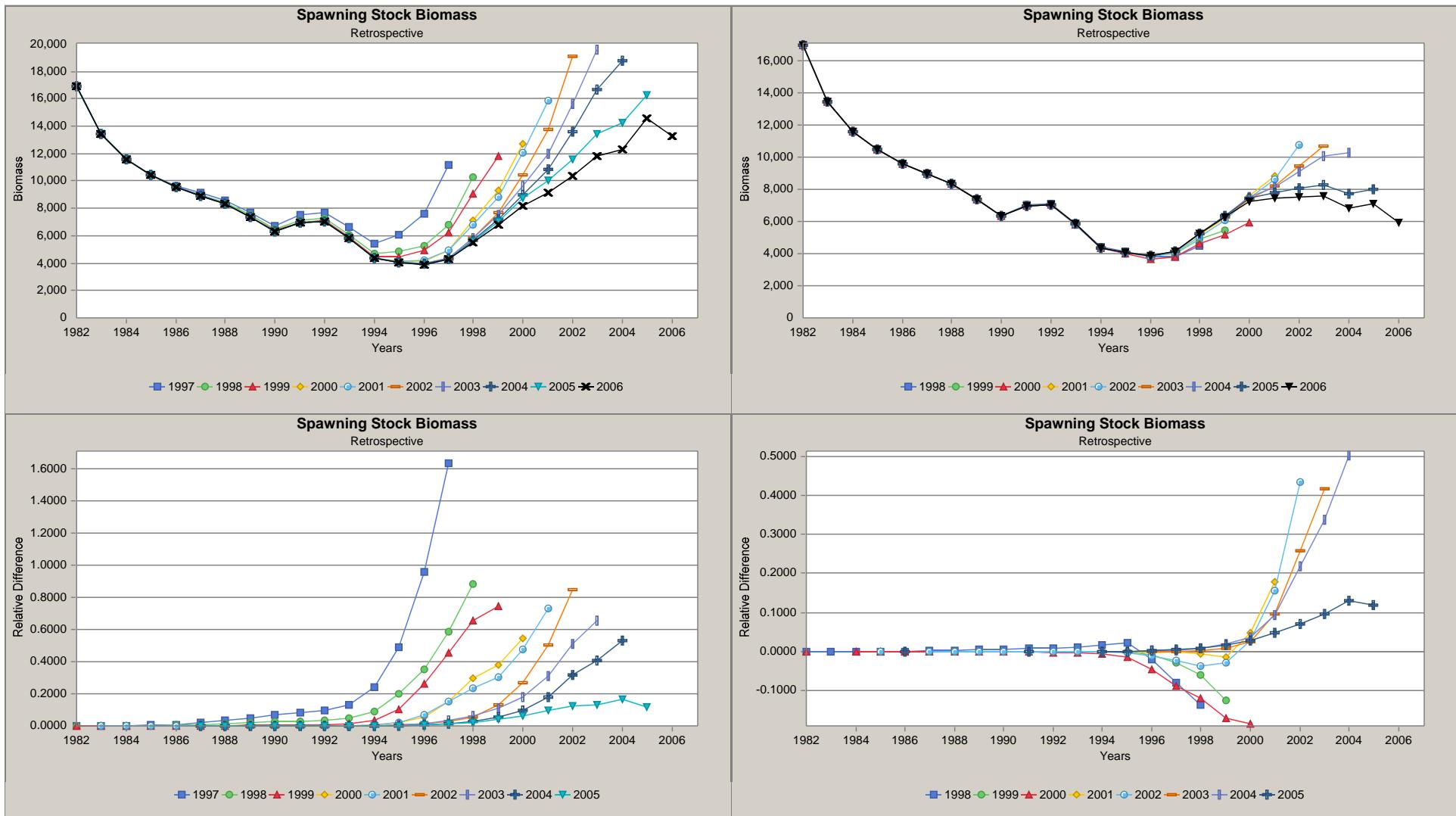
# SPLIT RUN



Bootstrap distributions of FISHING MORTALITY

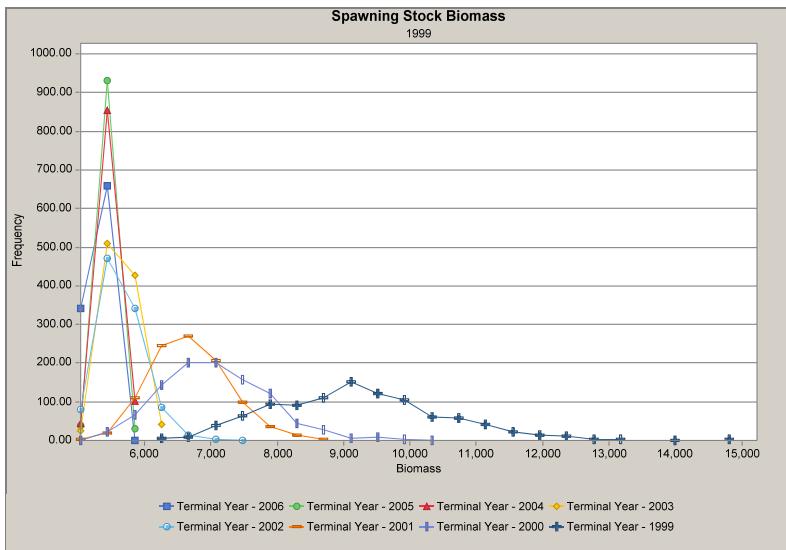
# BASE RUN

# SPLIT RUN



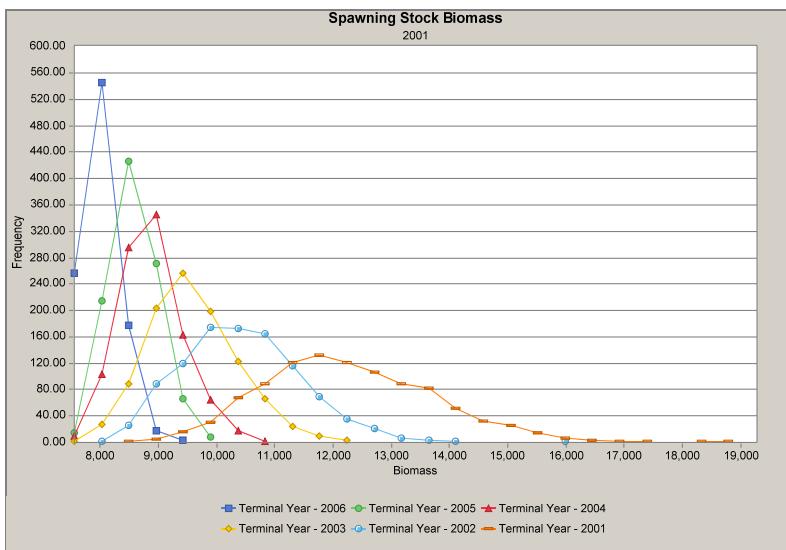
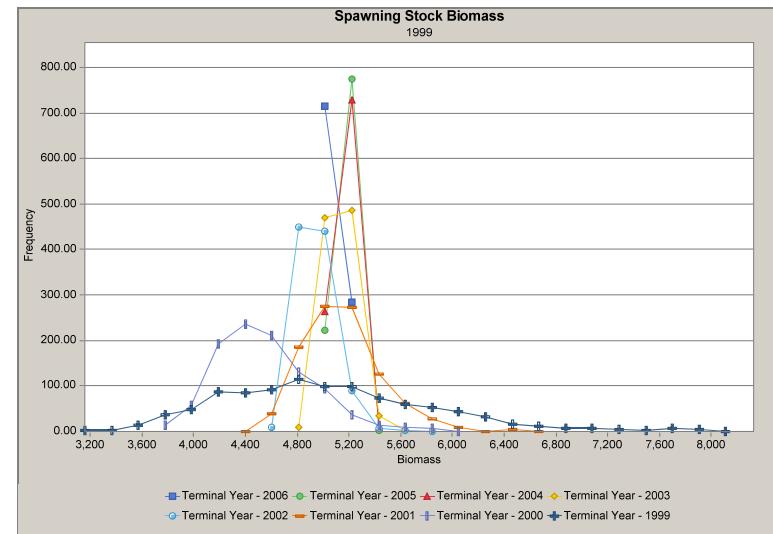
## SPAWNING STOCK BIOMASS

# BASE RUN

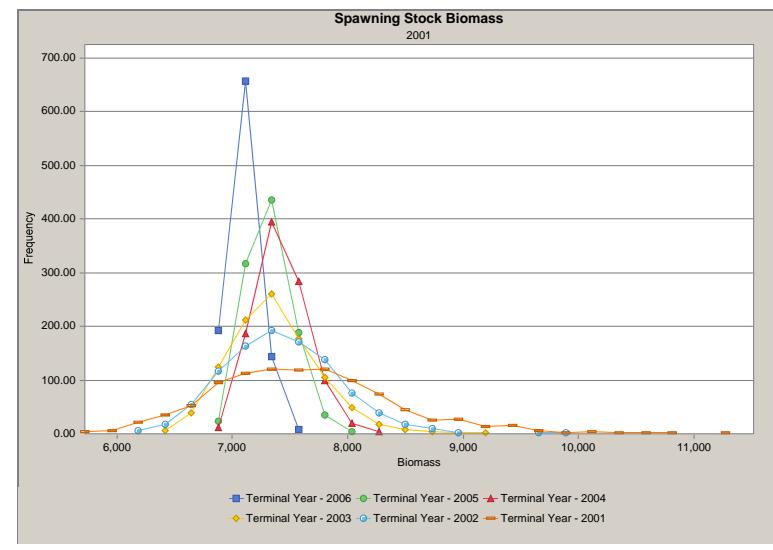


# SPLIT RUN

1999



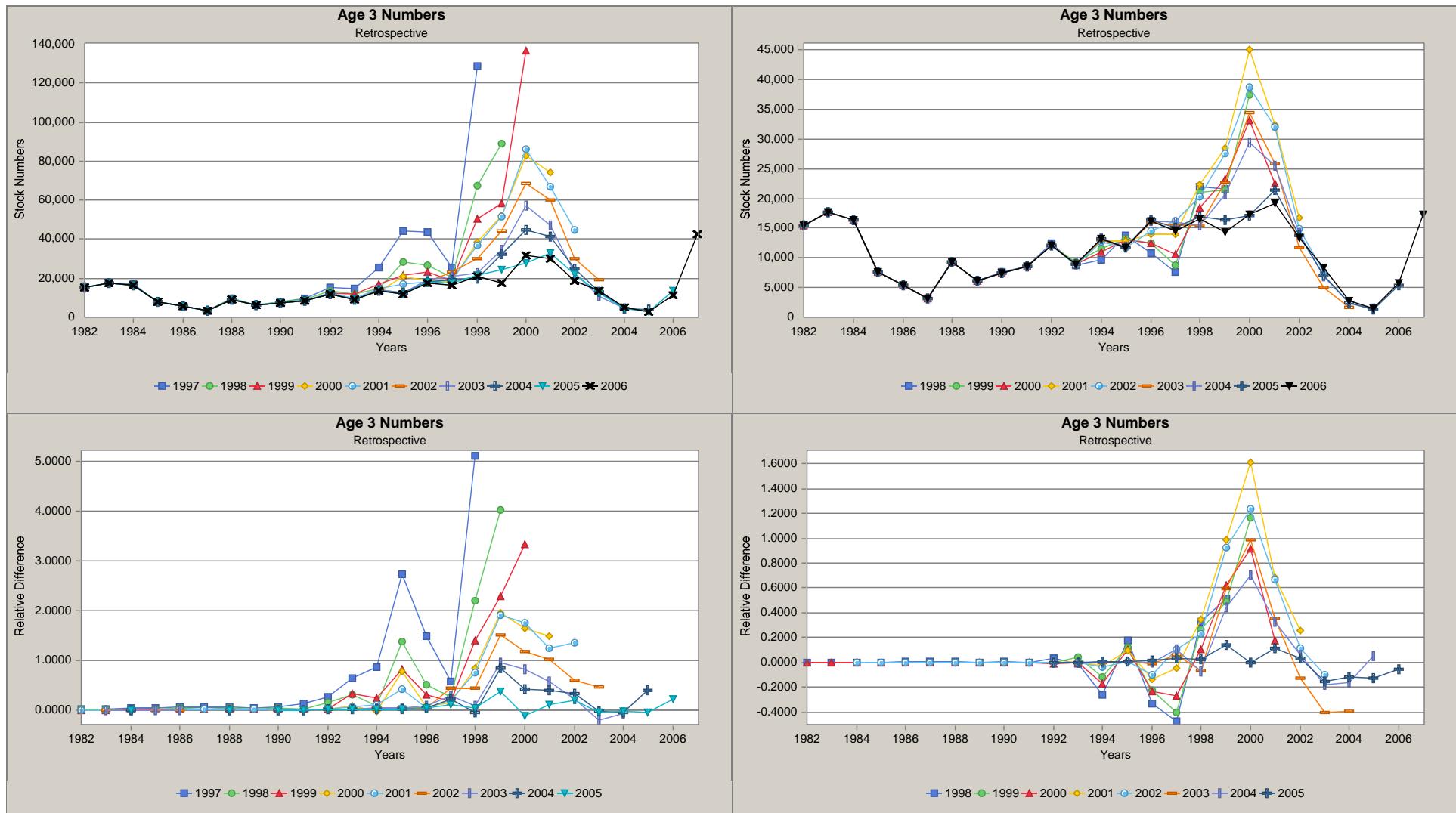
2001



Bootstrap distributions of Spawning Stock Biomass

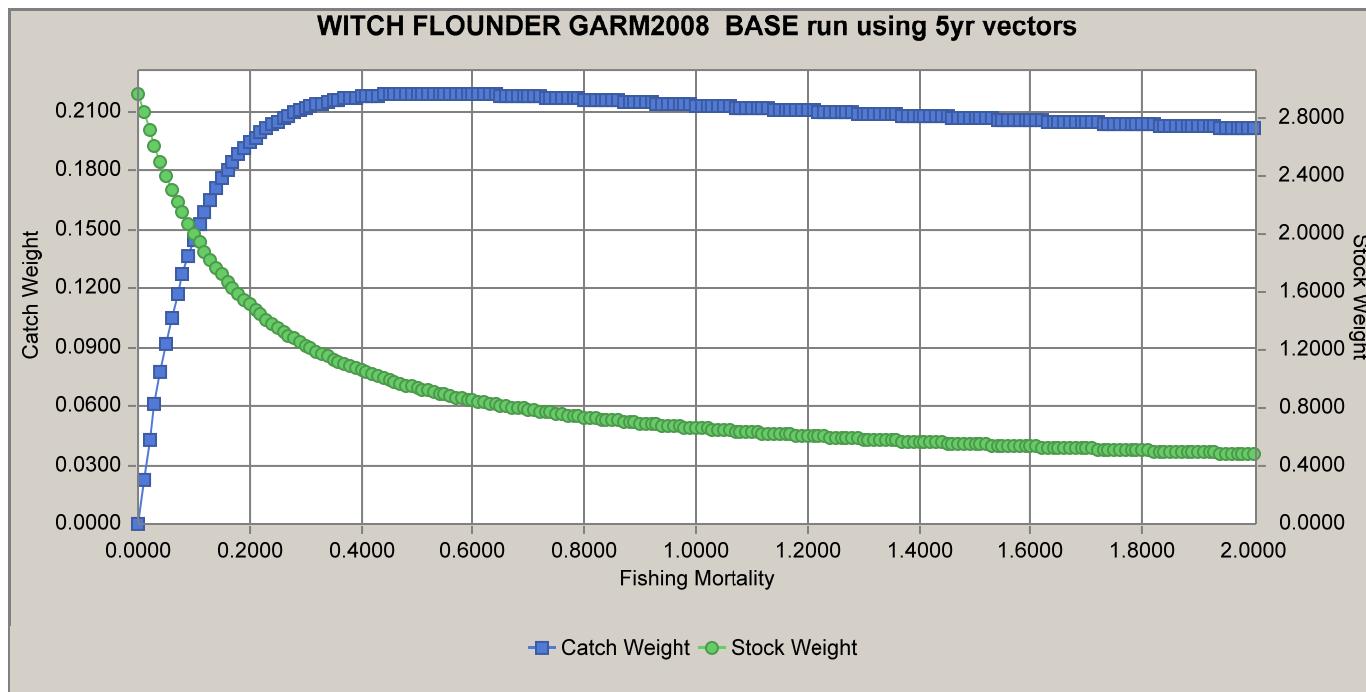
# BASE RUN

# SPLIT RUN



## AGE 3 RECRUITS

# Yield and Spawning Stock Biomass per Recruit: BASE RUN

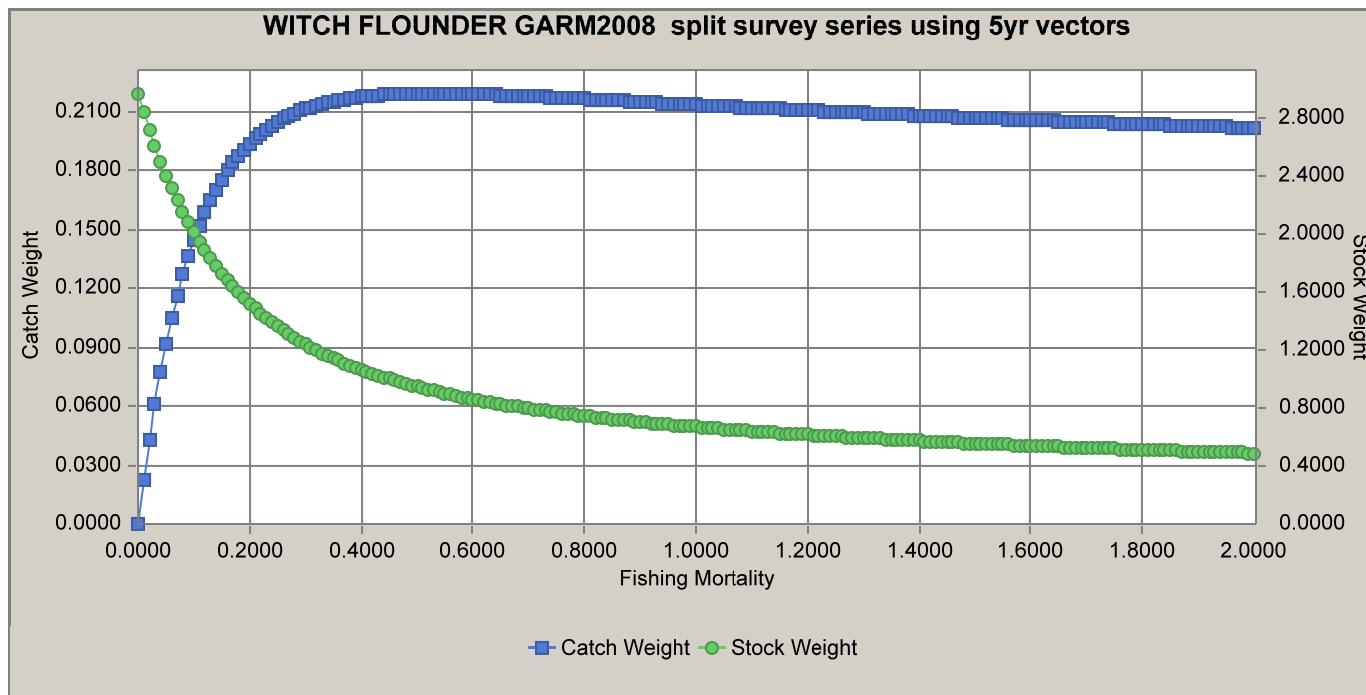


Age	Selectivity F	Selectivity M	Stock Wt	Catch Wt	SSB Wt	Maturity
3	0.0120	1.0000	0.0652	0.0965	0.0652	0.0600
4	0.0850	1.0000	0.1399	0.2129	0.1399	0.1600
5	0.2580	1.0000	0.2373	0.2803	0.2373	0.3400
6	0.4270	1.0000	0.3094	0.3541	0.3094	0.5800
7	0.7400	1.0000	0.3993	0.4478	0.3993	0.7900
8	1.0000	1.0000	0.4918	0.5401	0.4918	0.9100
9	1.0000	1.0000	0.5797	0.6226	0.5797	0.9600
10	1.0000	1.0000	0.6654	0.7146	0.6654	0.9900
11	1.0000	1.0000	0.8904	0.8904	0.8904	1.0000

Reference Point	F	YPR	SSBR	TSBR	Mean Age	Mean GT	Exp Spawn
F Zero	0.00000	0.00000	2.47182	2.97441	7.88231	11.72591	2.34179
F-01	0.21440	0.19781	0.99471	1.46428	5.92066	9.27642	1.47272
F-Max	0.52120	0.21915	0.49037	0.91917	5.04411	7.57332	0.92054
F40 %MSP	<b>0.21620</b>	0.19824	0.98903	1.45831	5.91153	9.26122	1.46778

$F_{msy} = 0.22$

# Yield and Spawning Stock Biomass per Recruit: SPLIT RUN



Age	Selectivity F	Selectivity M	Stock Wt	Catch Wt	SSB Wt	Maturity
3	0.0117	1.0000	0.0652	0.0965	0.0652	0.0600
4	0.0854	1.0000	0.1399	0.2129	0.1399	0.1600
5	0.2480	1.0000	0.2373	0.2803	0.2373	0.3400
6	0.4107	1.0000	0.3094	0.3541	0.3094	0.5800
7	0.7258	1.0000	0.3993	0.4478	0.3993	0.7900
8	1.0000	1.0000	0.4918	0.5401	0.4918	0.9100
9	1.0000	1.0000	0.5797	0.6226	0.5797	0.9600
10	1.0000	1.0000	0.6654	0.7146	0.6654	0.9900
11	1.0000	1.0000	0.8904	0.8904	0.8904	1.0000

Reference Point	F	YPR	SSBR	TSBR	Mean Age	Mean GT	Exp Spawn
F Zero	0.00000	0.00000	2.47182	2.97441	7.88231	11.72591	2.34179
F-01	0.21540	0.19795	0.99857	1.46883	5.92477	9.27421	1.47920
F-Max	0.52610	0.21942	0.49326	0.92299	5.04913	7.57093	0.92657
F40 %MSP	<b>0.21850</b>	0.19869	0.98889	1.45867	5.90924	9.24827	1.47080

$$F_{msy} = 0.22$$

## G. WITCH FLOUNDER Biological Reference Points

	Fmsy F40%	Y/R (kg)	SSB/R (kg)	Mean Age 3 Recruitment (fish, millions)	Y/R and SSB/R		Agepro Projections	
					SSBmsy (mt)	MSY (mt)	SSBmsy (mt)	MSY (mt)
<b>SARC 37</b>	0.23	0.2232	1.2882	19.6	25,248	4,375		
<b>GARM 2008</b>								
BASE RUN	0.22	0.1982	0.9890	13.2	13,055	2,616	12,687	2,578
SPLIT RUN	<b>0.22</b>	0.1987	0.9889	10.9	10,779	2,166	<b>10,863</b>	<b>2,195</b>

Current BRP based on Y/R and SSB/R analysis from SARC37 benchmark

AgePro (long-term stochastic) projections used:  
 same 5-yr average vectors as Y/R;  
 recruitment: re-sampling from empirical cdf

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